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DISORDERS IN THE U.S. NAVY:  
THE PSYCHOSES***

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**THE EPIDEMIOLOGY OF MENTAL DISORDERS IN THE U.S. NAVY:  
THE PSYCHOSES**

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### Abstract

This study provides a comprehensive overview of psychosis in U.S. Navy enlisted personnel. The objectives of this study were to (1) determine first hospitalization incidence rates of psychosis in an initially healthy young adult population; (2) determine institutional and personal costs in terms of interruption of military careers and premature manpower losses; (3) determine the age at onset (first hospitalization) and the duration of acute illness; and (4) to evaluate the effects of age, gender, race, and education on disease onset and outcome. The sample included all first hospitalizations for psychosis of active-duty enlisted persons during the period 1980 to 1988. All information used in this study was from official personnel and medical records. Patients' service and medical histories were tracked through 1992 to provide at least 4 years of follow-up data. Incidence rates varied greatly over time and across gender, age, race, and diagnostic groups. A large increase in the rate of affective psychosis for women was in sharp contrast to marked declines in rates for drug psychoses, schizophrenia, and other inorganic psychoses and to the relatively stable rates for alcohol psychoses and paranoid states. Psychoses had a very significant negative impact on naval careers.

## Introduction

Rates of mental disorders in the U.S. Navy and Marine Corps have been studied for many years, and incidence rates based on hospitalization in these populations have been well documented.<sup>1-5</sup> Mental and emotional disorders represent a major public health problem in the armed forces as they do in society generally. During a peacetime period prior to the Vietnam War (1960 to 1962), psychiatric disorders were the leading cause of invalidating (medically discharging) personnel from the naval service. From 1966 to 1969, the average annual first hospitalization rates for psychiatric conditions were 966/100,000 for men and 3,785/100,000 for women.<sup>6</sup> In subsequent decades, mental disorder has continued to be a major cause of hospitalization and premature attrition for the naval service. Though predominantly male, large numbers of women have entered the armed forces in the past two decades, and duty assignment policies have changed to allow women to be assigned to ships. This made possible, for the first time, comparisons of morbidity by gender, as well as other demographic and occupational characteristics. The health effects of assigning women to ships has been investigated in a large-scale program of recent studies,<sup>7</sup> but hospitalization rates for mental disorders were not examined despite evidence suggesting that shipboard conditions are associated with psychiatric incidence rates.<sup>8</sup>

This new series of studies examines more detailed data on mental disorder hospitalizations in U.S. Navy personnel. One category of mental disorder in which examination of hospitalizations is likely to yield 100% case ascertainment, especially in the military, is psychosis. Psychoses are mental disorders in which impairment of mental functions has developed to a degree that grossly interferes with insight, ability to meet some ordinary demands of life, or to maintain adequate contact with reality.<sup>9</sup> The relevance of such disorders to performance of military duties can be readily appreciated. Nearly 10% of all male patients hospitalized for psychiatric reasons between January 1967 and December 1971 (N = 4390) received a diagnosis of psychosis.<sup>10</sup> Psychotic cases are associated with a disproportionately longer hospital stay and medical transfer.<sup>11</sup> They have the least favorable prognosis for further service of all hospitalized mental disorders,<sup>12</sup> and they predict receipt of medical disability retirement.<sup>13</sup> Although functional psychoses are more prevalent than organic psychoses among Navy personnel and are more likely to be associated with a pre-Navy psychotic condition,<sup>14</sup> little

is known about the demographic distributions of psychotic subtypes or their relationships to hospitalization and outcome.

The purpose of the present study was to provide a comprehensive overview of the psychoses (and other mental disorders in future studies) in a substantial segment of the U.S. adult population—U.S. Navy enlisted personnel. The objectives of this study were to (1) determine first hospitalization incidence rates of psychosis in an initially healthy young adult population; (2) determine institutional and personal costs in terms of interruption of military careers and premature manpower losses; (3) determine the age at onset (first hospitalization) and the duration of acute illness; and (4) to evaluate the effects of age, gender, race, and education on disease onset and outcome. Determining the vulnerability of various groups can help develop useful hypotheses about etiology and prognosis and guide future research. Knowledge of the onset, course, and outcome of specific mental disorders in a large population such as the U.S. Navy can lead to better understanding of the interaction of antecedent characteristics, environmental conditions, and presenting symptoms in relation to work and social adjustment.

## Methods

### Sample

The sample included all first hospitalizations for psychosis of active-duty enlisted persons during the period 1980 to 1988. The period 1980 to 1988 was chosen for these analyses because diagnostic criteria (ICD-9; International Classification of Diseases, 9<sup>th</sup> Version, Clinical Modification) were stable and because large numbers of women were serving on duty. Also, this time period has been and will be utilized for many other epidemiological studies and serves as a convenient baseline period against which later disease trends can be evaluated. For the follow-up portion of the study, patients' service and medical histories were tracked through 1992 to provide at least 4 years of follow-up data. Psychotic disorders were defined using major ICD-9 diagnostic categories.<sup>9</sup> This is the official nomenclature used by the Department of Defense for mental disorders. Diagnostic categories were essentially those of the Diagnostic and Statistical Manual,<sup>15</sup> adapted for military use with some modifications for drug and alcohol psychosis diagnoses. Descriptions of major psychosis categories from the same source are as follows: Alcohol psychoses (291)--Organic psychotic states due mainly to excessive consumption of alcohol; defects in nutrition are thought to play an important role. Drug psychoses (292--

Organic mental syndromes that are due to consumption of drugs (notably amphetamines, barbiturates, and opiate and LSD groups) and solvents. Schizophrenia (295)--A group of psychoses in which there is a fundamental disturbance of personality, a characteristic distortion of thinking, often a sense of being controlled by alien forces, delusions that may be bizarre, disturbed perception, abnormal affect out of keeping with the real situation, and autism. Affective psychoses (296)--Mental disorders, usually recurrent, in which there is a severe disturbance of mood (mostly compounded by depression and anxiety but also manifested as elation and excitement), which is accompanied by one or more of the following—delusions, perplexity, disturbed attitude to self, disorder of perception and behavior; these are all in keeping with the individual's prevailing mood (as are hallucinations when they occur). There is a strong tendency to suicide. Paranoid state (297)--A psychosis, acute or chronic, not classifiable as schizophrenia or affective psychosis, in which delusions, especially of being influenced, persecuted, or treated in some special way, are the main symptoms. The delusions are of a fairly fixed, elaborate, and systematized kind. Other nonorganic psychoses (298)--Psychotic conditions due to or provoked by emotional stress; environmental factors are a major part of etiology (description of ICD-9 Code 298). Diagnostic categories omitted because cases were too few for meaningful analyses were senile/presenile psychoses (ICD-9 Code 290), transient organic psychotic conditions (293), other organic psychotic conditions (chronic)(294), and psychosis with origin specific to childhood (299). In addition, a total psychotic group consisting of all of the above major diagnostic categories was formed to compare with a control group of randomly drawn personnel who served but were never hospitalized for mental disorder during the specified observation period.

## Measures

Diagnoses were made by professionals with varying amounts of training and experience, but many were made by psychiatrists with considerable training and experience. The diagnoses used were those given at the time of discharge from the hospital after a period of observation and often after psychological testing. In any case, diagnoses were important in clinical and administrative decisions concerning all patients. For the more severe conditions (e.g.,schizophrenia), medical boards and physical evaluation boards were convened to determine

fitness for duty and eligibility for compensation. Thus, the final diagnosis represented an important professional opinion after clinical interviews and observations.

All information used in this study was from official personnel and medical records. For example, age, sex, race, dates and lengths of hospitalization, and dates and types of discharge were obtained from existing administrative and hospitalization records. None of the information used was self-reported. Also, data were thoroughly edited for accuracy by internal consistency checks. In most cases, subjects had many records of personnel and medical events with demographic information duplicated in each record. In addition to the demographic variables of sex, age, race, education, paygrade (1=lowest enlisted rank/recruit, 9=highest enlisted rank), and marital status (at discharge), an aptitude or mental ability variable was created. This mental group variable was derived from either a General Classification Test score or an Armed Forces Qualification Test score, both general aptitude test scores, converted to a percentile scale and grouped into five categories or levels, from 1 for high to 5 for low. Data were missing for the mental group variable in 687 of the 7,212 psychotic cases. Two other classes of variables included characteristics at hospitalization and discharge. Measures at time of hospitalization included number of diagnoses, number of prior enlistments, term or length of enlistment, length of service, days of hospitalization, disposition from the hospital, and assessment of whether the condition existed prior to enlistment. For this last measure, the attending physician gave an opinion about whether the condition for which the patient was hospitalized existed prior to entry into the Navy. Measures at time of discharge included number of hospitalizations, medical boards, physical evaluation boards, unauthorized absences, desertions, promotions, demotions, recommendation for reenlistment, early attrition, and remaining in the Navy after 1992. The early attrition indicator was a dichotomy based on completion of obligated service. If the individual was separated from the Navy for any reason (Navy Loss code) before his or her term of enlistment expired, he or she was classified with early or premature attrition. The only exceptions to this rule were a recommendation for officer training or leaving the service within 3 months of expiration of enlistment to attend school. Attrition included medical disability, unsuitability, misconduct, and convenience of the U.S. Government.

## Data Analysis

The Epidemiological Interactive System (EPISYS) contains hospitalization, demographic, occupational, and military duty assignment records for all Navy enlisted personnel on active duty between 1 January 1980 and 30 September 1994. This computerized program permits rapid access and analysis of epidemiological data. Hospitalization data are obtained from the Naval Medical Information Management Center, Bethesda, Maryland, and demographic, occupational, and service history information is provided by the Naval Military Personnel Command in Washington, DC. EPISYS uses person-years as denominators and first hospitalizations for computing incidence rates; it is described in detail in a recent technical report.<sup>16</sup> Confidence intervals were calculated using the Poisson distribution as described elsewhere.<sup>17</sup> Follow-up analyses were conducted using SPSS Statistical Data Analysis software.<sup>18</sup>

## Results

The number of first hospitalizations for psychosis from 1980 through 1988 was 7,212. The largest number of psychotic cases from 1980 to 1988 were diagnosed as schizophrenia (incidence rate = 57/100,000), followed by affective psychosis (38/100,000), other non-organic psychoses (31/100,000), alcohol psychoses (16/100,000), drug psychoses (11/100,000), and paranoid states (4/100,000).

## Psychotics Versus Controls

Comparisons of the psychotic and control groups on demographic characteristics at the time of entry into the service or at the beginning of the observation period are shown in Table I. Composition by gender was the same, 91% males and 9% females. Controls were more often under 19 years of age and less often over 20 years at the beginning of the observation period (chi-square  $X^2_2 = 538$ ,  $p < .001$ ). There was no difference in the two groups in years of education; 82% of psychotics were high school graduates compared with 84% of controls. Psychotics were less often in a higher mental group than controls, but this difference was small ( $X^2_2 = 21$ ,  $p < .001$ ). The data for paygrade reflects the fact that 67% of the psychotics were recruits (paygrade 1) at the beginning of the observation period, while 33% had been on duty long enough to be at higher paygrades. The percentage of recruits for the control group was



slightly higher ( $X^2_1 = 9, p = .003$ ) reflecting their younger age. A higher mental group classification is a positive indicator for successfully completing a first enlistment. Controls had a slightly more favorable prognosis than psychotics in terms of this variable.

For both psychotic and control groups, females were older, better educated, and had higher aptitude scores (mental group) than males. This result reflects differences in enlistment practices for men and women. Generally, both men and women are required to be at least 18 years of age and high school graduates at the time of enlistment. However, due to more job openings for men, age and diploma exceptions occur more frequently for men. That is, men have more often enlisted at age 17 and have been given 2 to 3 years to complete their high school requirements. Table I also shows that more men than women in the control group were at paygrades higher than 1 (recruit). This is consistent with the fact that men typically had longer periods of service at the beginning of the observation period than women. However, this difference was not present for the psychotic group.

Table II summarizes characteristics of the psychotic group at the time of hospitalization, including gender differences. Almost half of the psychotics had served less than 2 years at the time of hospitalization. Again, males had served longer than females prior to hospitalization. More female than male psychotics had initially enlisted for 4 years, and fewer had completed a first enlistment than males. When released from the hospital, more men than women were released to a Holding Company for temporary duty while awaiting new duty assignments rather than returning directly to an organizational unit. This difference in disposition from the hospital probably was more a matter of administrative convenience than clinical significance, although there were differences among psychotic groups in type of disposition. In 21% of the psychotic cases, the condition for which hospitalization occurred was thought to exist before enlistment in the Navy. The length of stay in the hospital did not differ for men and women; 42% were hospitalized for more than 20 days, considerably longer than for most conditions.

Status at the time of discharge from the service is shown for psychotics and controls in Table III. At discharge, psychotics had shorter lengths of service, lower paygrades, fewer promotions, fewer hospitalizations, and more medical boards and physical evaluation boards than controls, all characteristics consistent with premature separation from service because of psychosis. More controls were single and fewer were married than psychotics despite the difference in length of service. On all three outcome indicators, early attrition, recommendation

for reenlistment, and remaining in the service, psychotics had far fewer favorable outcomes than controls. The results for the first two indicators are shown in Tables IV and V by age, education, and mental group. For the third indicator, controls were much more likely to continue in service beyond the observation period—only 396 psychotics remained (5%) compared with 2,674 controls (23%).

### **Incidence Rates by Sex, Race, and Age**

Incidence rates (first hospitalizations) are shown in terms of number of cases per 100,000 person-years for each psychosis by sex, race, and age in Tables VI through XI. Where too few cases were available for meaningful analysis, those portions of the tables were omitted.

For alcohol psychoses, the incidence rate for males was much higher than that for females (Table VI). Rates varied by race with those classified as White having a higher rate than those classified as Black or Other. With respect to age, the incidence rate was much higher for personnel ages 30 and above. For alcohol psychoses, Black and White males had similar patterns—members younger than age 30 had a lower rate than members older than 30. For the Other racial group, rates were relatively low for all age categories. White females showed no distinctive pattern with respect to age, and females classified as Black or Other had too few cases for rate computation.

It should be noted that alcohol psychoses represent only a small portion of hospitalizations for alcohol problems in the Navy. For example, there were more than 28,000 first hospitalizations for alcohol dependence (ICD-9 Code 303) during the 1980 to 1988 period. There also are other diagnoses for alcohol-related problems. Furthermore, many personnel treated for alcoholism in the Navy during this time were never hospitalized but attended outpatient or residential rehabilitation programs.<sup>19</sup> Similarly, drug psychoses represent only a portion of drug-related problems. Rates of alcohol and drug dependence or abuse will be examined in future studies.

For drug psychoses, the rate for males was double that for females (Table VII). Whites and Blacks had the same rates while the Other group had a slightly lower rate but not significantly so. Incidence was related to age with personnel age 30 or older having a much lower rate than younger personnel. All male racial groups showed a similar pattern with respect to age—younger personnel (below age 30) had much higher rates than older personnel. For

female White personnel there was a similar trend (only one case over age 30), while the female Black and Other groups had too few cases for comparison.

Males had a somewhat higher rate of schizophrenia than females (Table VIII) while Blacks had a higher rate than Whites or Other race. Schizophrenic patients tended to be young. All racial groups, male and female, showed similar trends with respect to age at admission; cases were predominantly age 30 or younger.

The affective psychoses differed from other psychoses in several respects. The rate for females was much higher than that for males (Table IX). Whites had the highest rate among racial groups. Overall, there was little variation in rate with age. Incidence rates for males were similar over the three racial groups and did not vary significantly by age. White females, however, had higher rates than other groups over most age categories. Females classified Black or Other also were distributed over a wide age range.

Paranoid states was the smallest group examined, but some meaningful comparisons were possible (Table X). Cases were predominantly male. Black personnel were overrepresented. Admissions were most often in the 25- to 40-year groups. For all male racial groups, cases were predominantly in the 22 to 34 age range. Female cases were too few for analysis.

Incidence rates for Other nonorganic psychoses were similar for males and females, but slightly higher for females (Table 11). Blacks had a higher rate of admission than other racial groups. With respect to age, younger personnel had higher rates; in all racial groups for males and females, cases tended to be young.

### **Changes in Incidence Rates Over Time**

Incidence rates for alcohol psychoses reached a high point in 1982 and then declined in the late 1980s (Fig. 1). Rates for drug psychoses showed a precipitous drop after 1982. In 1986, the rate was 3.51 compared with 30.84 in 1980. The rate then increased in 1987 and 1988. This drastic shift in hospitalization rates for drug psychoses was co-incidental with the Department of Defense "zero tolerance" for drug abuse policy instituted in the mid-1980s. The rate of first hospitalizations for schizophrenia showed a sharp drop over the 9-year observation period, from 92.11 per 100,000 person-years in 1980 to 29.22 per 100,000 in 1988. There is no ready explanation for this large shift in schizophrenia incidence although there is a possibility that new

antipsychotic drugs resulted in rapid amelioration of symptoms and a reduced number of cases diagnosed schizophrenia at discharge from the hospital.

The incidence rate for affective psychoses increased substantially during 1980 to 1988, more than doubling for the Navy enlisted population. Because the rate of affective psychosis was much higher for women than for men overall, it was of interest to plot rates separately for men and women. Women showed a much greater increase in incidence than men (Fig. 2). For women, the rate more than quadrupled from a low of 34.98 in 1982 to 137.83 in 1988. The incidence rates for paranoid states showed little variation over time. The rate for other nonorganic psychoses declined substantially from 1980 to 1988.

### **Psychotic Groups at Time of Accession or Beginning of Observation Period**

Comparisons of psychotic groups on demographic and outcome variables are shown in Tables XII through XIV for all diagnoses examined separately. Table XII shows differences among groups at the beginning of the observation period (1980). The expected rate based on all psychotic groups combined was 91% male and 9% female. The affective psychoses had more women than expected (15%); paranoid states had more men (98%). Alcohol and drug psychoses had slightly higher rates for men than expected (95%), while other psychoses had distributions similar to that for the total psychosis group. With respect to age, personnel with alcohol psychoses were somewhat older, and personnel with drug psychoses were somewhat younger than other psychotics. Personnel with drug psychoses tended to have less education than other groups. Alcohol psychosis was associated with higher paygrades than expected and drug psychoses with lower paygrades. Personnel with alcohol psychoses had higher mental group (aptitude) scores than others, while schizophrenics had lower scores.

### **Psychotic Groups at Time of Hospitalization**

Differences among psychotic groups at the time of hospitalization are shown in Table XIII. The variable, Type of Diagnoses, indicated whether the first-time psychotic diagnosis was a primary, or other diagnosis. For schizophrenics, the diagnosis was much more often the primary diagnosis than in other groups. With respect to the number of enlistments served prior to hospitalization, schizophrenics and drug psychoses were much more likely to be in their first enlistment than other groups; alcohol psychoses were slightly less likely to be in their first

enlistment when hospitalized. Individuals with alcohol psychoses were much more likely to be petty officers when hospitalized than other groups; affective psychoses and paranoid states had similar trends, while drug psychoses and schizophrenics had the fewest petty officers. Length of service similarly showed substantial differences, with alcohol psychoses having longest service and drug psychoses and schizophrenics shortest. Schizophrenics were much more likely to have only one diagnosis, while drug and alcohol psychoses were much more likely to have multiple diagnoses than other groups.

With respect to type of disposition from the hospital, drug and alcohol psychoses were much more often released directly to an organizational unit while patients in other groups were more often assigned to a Holding Company, a temporary status while awaiting assignment to a new duty station. For schizophrenics, a substantial number of cases (35%) were thought to have had the condition prior to entering the service, while for alcohol and drug psychoses, there were few such cases (less than 10%). Length of hospitalization varied considerably by diagnosis; schizophrenics had far longer stays than other groups; alcohol and drug psychoses had the shortest stays.

### **Psychotic Groups at the Time of Discharge**

Differences among psychotic groups at the time of discharge are shown in Table XIV. Marital status at the time of discharge differed among psychotic groups as follows: more personnel with alcohol psychoses were separated or divorced than personnel in other groups; more personnel with affective psychoses were married or separated/divorced than personnel in other groups, and more personnel with drug diagnoses were single and fewer were married than personnel in other groups. The alcohol psychosis group was much older at discharge than other groups (54% age 30 or older), particularly the drug psychosis group (8% age 30 or older). Schizophrenics also were somewhat younger than other groups at discharge.

The alcohol psychosis group had many more hospitalizations for other individual conditions than any other group during their Navy careers (42% more than 3). The schizophrenic group had the fewest hospitalizations (51% had only one—for schizophrenia). The schizophrenic group was most likely to be referred to medical and physical evaluation Boards (39%), followed by the paranoid state group (31%). Such referral was an indicator of the severity of the condition. The alcohol group was much more likely to have had more than two

promotions (53%) than other groups, while schizophrenics were much more likely to have had no promotions. Both alcohol and drug groups, despite a large difference in length of service at discharge, were more likely to have one or more demotions (49% and 50%, respectively). Both the alcohol and drug groups were more likely to have had two or more unauthorized absences in their records than other groups. Similarly, alcohol and drug groups more often had one or more desertions in their records than other groups. The alcohol psychosis and paranoid states groups had higher paygrades at discharge (56% were petty officers). The alcohol group also had a longer period of service at discharge than other groups (48% more than 6 years), followed by paranoid states (32%) and affective psychoses (31%).

Psychotic groups varied somewhat on rates of early attrition, although all groups had much higher early attrition than controls. Among psychotic groups, alcohol psychoses had the least early attrition while schizophrenics had the most. Remaining differences were relatively small. With respect to recommendations for reenlistment at the time of discharge, paranoid states had the highest rate of negative recommendations (both No and No Because of Disability) (89%), followed by schizophrenia and other nonorganic psychoses. Alcohol psychoses had the lowest rate of negative recommendations. On the third indicator of outcome, remaining in service after 1992 (usually with the intention of making the Navy a career), personnel diagnosed with an alcohol psychosis were most likely to continue their careers after hospitalization (12%) while schizophrenics were least likely to do so (1%). All psychotic groups had a far lower probability of continuing in service than controls.

### **Age of Onset and Incidence in the Navy**

Persons manifesting antisocial behaviors are not likely to be enlisted in the Navy. Symptoms of antisocial personality tend to appear early (often in childhood), persist over long periods, and usually affect family and school adjustment. Screening procedures at the time of enlistment tend to focus on antisocial behaviors such as drug abuse and arrest records, so that risks of antisocial behavior in the military can be minimized. Other disorders, particularly the psychoses, have later ages of onset so that risks are not apparent from early school, work, or medical history data. Similarly, symptoms of neurosis and other less severe mental disorders are not likely to be detected in pre-induction examinations. Alcohol abuse and psychosis are not likely to occur until individuals are able to purchase liquor and/or participate in drinking binges.

Age at the time of hospitalization provides a reasonably good approximation of age or onset for severe psychiatric conditions such as psychosis. At the first signs of significant cognitive or social impairment, individuals are likely to be referred for medical consultation in the military. Overt psychotic symptoms are almost certain to lead to immediate hospitalization. Of the six major psychotic groups studied, drug psychoses, schizophrenia, and other nonorganic psychoses had younger ages at onset (modal ages 20 to 21) than other groups. Affective psychoses and Paranoid states (modal ages 25 to 29) and Alcohol psychoses (modal ages 30 to 34) had later ages of onset.

### **Severity and Duration of Illness**

Severity and duration of illness can often be determined from available data. Length of stay in the hospital reflects the acute phase of the illness. Return to duty and serving out the term of obligated service are indicators of remission or recovery. Rehospitalization for the same or related condition or discharge for medical disability signifies persistence or long duration of the illness. Relatively few who were diagnosed psychotic remained in service and even fewer completed a service career successfully. The group that appeared to be somewhat of an exception to this rule was alcohol psychosis. For decades the Navy has offered special rehabilitative programs for personnel with alcohol problems and has been willing to make significant investments to retain these personnel who are mostly experienced petty officers.<sup>19</sup> In the case of schizophrenia, the Navy does not offer long-term treatment and usually discharges these patients immediately and transfers them to the Veterans Administration for care. However, a small number of schizophrenics recover sufficiently to complete obligated service successfully. In any case, the prognosis for continuation in service among those diagnosed psychotic was generally poor. Table XI shows a composite of several indicators of severity and duration, including condition existed prior to service, days hospitalized, referred to medical board, early attrition, recommended for reenlistment, and remained in the Navy after 1992. In terms of these indicators, schizophrenia had the greatest negative impact upon Navy careers, while alcohol psychosis had the least.

### Discussion

This study examined several aspects of hospitalization for psychotics in the naval service: (1) demographic and service history characteristics that distinguished psychotics from controls, (2) differences among major types or categories of psychosis at entry into service and at hospitalization, (3) differences in outcome among types of psychoses, (4) gender differences in incidence and outcome, and (5) changes in incidence rates over time.

With respect to differences between psychotic and control groups at the time of induction, age, rank, and marital status differed significantly with psychotics being somewhat older, higher ranking, and more likely to be married than controls. One possible explanation may involve a variant of the "healthy worker effect" in which younger, single, pre-psychotic recruits could be screened out of the Navy or discharged without hospitalization more readily than the older, married pre-psychotics. On the other hand, members who enlist at an older age may include more underachievers or individuals with characteristics that make them more vulnerable to psychotic disorder and more likely to be discharged early. There were also large differences among psychotic groups in composition by gender, race, and age. These results point to more vulnerable subpopulations in the Navy and may indicate particular groups with greater risk and/or who may be experiencing elevated levels of stress. Also, there were striking differences among psychotic groups in stability or change in incidence rates over time. Such variations may reflect changing environmental or social conditions in the workplace that could lead to increased inefficiency and separation from the service.

Clearly, psychoses had a very significant negative impact on naval careers. Only a small percentage of those diagnosed psychotic completed their terms of obligated service successfully (14%), and only a small number (5%) continued to serve after the 12-year observation period. In contrast, 61% of controls successfully completed their enlistments. Schizophrenics had the lowest rate of career retention (1%), while those with alcohol psychoses had the highest (12%). The alcohol psychosis group were older, had longer service, and were more often petty officers at the time of hospitalization than other psychotic groups, which undoubtedly played a role in their retention after hospitalization. Schizophrenics typically were young, had little service experience, and were usually in the lowest paygrades when hospitalized. Consistent with an earlier study,<sup>14</sup> they were also most likely to have an indicated pre-Navy psychotic condition. This finding, in conjunction with the somewhat older age and married profile of the pre-



psychotics in general, is consistent with the vulnerability hypothesis of schizophrenia, which assumes psychosis (schizophrenia in particular) occurs only in a vulnerable individual and that vulnerability requires a life event stressor to trigger an episode.<sup>20</sup> In this model, premorbid personality characteristics have been associated with the incidence of mental disorder, and social (e.g., problems with interrelationships) and physical ecological factors (e.g., living conditions, occupational hazards) increase the risk of disorder in vulnerable individuals.<sup>21</sup> Given the potential for stressful life events occurring in a military population,<sup>8</sup> renewed research attention to methods of screening for psychiatric vulnerability is recommended. Whereas the focus of previous studies has been primarily on discriminating mentally healthy from unhealthy naval personnel,<sup>22-25</sup> increased emphasis should be placed on following recruit populations to determine specific kinds of impairment, if any.

The very large increase in the rate of affective psychosis for women was in sharp contrast to marked declines in rates for drug psychoses, schizophrenia, and other nonorganic psychoses, and the relatively stable rates for alcohol psychoses and paranoid states. This trend is of special concern because of the following description of affective psychoses in the Glossary of Mental Disorders, ICD-9:<sup>9</sup> "There is a strong tendency to suicide."

This study has afforded more precise estimates of incidence in the Navy population than have been available heretofore and identified a number of correlates of mental disorder. Limitations of the study have to do with restriction of age range—more than 90% of the Navy enlisted population are age 17 to 34—and the validity of the psychiatric diagnoses. While this population is not representative of the population of the United States as a whole, it offered a wide range of ages, occupations, environmental, and health risk conditions for study and included the age range where most psychotic episodes first occur. Also, knowledge of duration and outcome of illness was quite limited in this study because patients were followed only as long as they remained on active duty. Two long-term follow-up studies of naval personnel diagnosed with schizophrenia or other psychosis and discharged for medical disability showed substantial improvement within 5 years.<sup>26-27</sup> The current results suggested that affective psychosis may have a better long-term prognosis than some of the other groups in terms of recommendations for reenlistment and remaining in the Navy. On the other hand, in a recent study of civilian inpatients, few achieved a favorable outcome in the year after a first hospitalization for an affective psychosis.<sup>28</sup> In the light of implications for possible suicidal

behavior, further study of this type of psychosis would appear to be of special interest. It should also be noted that diagnostic subtype (e.g., schizophrenia vs affective psychosis) tends to be less reliable than classification into general diagnostic groups (e.g., psychotic vs nonpsychotic).<sup>29</sup> Unfortunately, there has been a notable lack of progress in the clear definition, understanding, and treatment of the psychoses, even with the advent of many new drugs to ameliorate acute symptoms. This assessment applies especially to the concept of schizophrenia.<sup>30</sup> We must continue to use such constructs because they are necessary and useful, but hopefully mental health workers over the next 20 years can devise new strategies to classify mental disorders in terms of etiologies, symptoms, prognoses, and effective therapeutic and preventive measures. Such a development would be of great benefit considering the enormous public health problem represented by mental illness in our society.

One of the advantages of this study, in contrast to many others, is that a comprehensive longitudinal study of an initially healthy segment of the general population was possible, and all hospitalizations for mental illness that occurred in this population were identified. A substantial amount of work and occupational information about each individual was available. Many studies of mental illness have suffered from the fragmentary nature of case sampling or the lack of well established or standardized diagnostic criteria, thus resulting in widely disparate results. The military population offers opportunities for large-scale epidemiological research that is unique and should contribute to understanding the onset and course of many diseases, including mental disorders. Future studies in this series will examine neurosis and mood disorders, personality disorders, and substance abuse.

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**TABLE I**  
 CHARACTERISTICS OF PSYCHOTIC AND CONTROL GROUPS AND SEX DIFFER-  
 ENCES AT BEGINNING OF OBSERVATION PERIOD OR ENTRY INTO SERVICE

	Psychotics		$\chi^2, p$	n	Total	
	Male %	Female %				%
Age						
<19	35.3	22.1	65.2, <.001	2462		34.1
19-20	28.1	26.8		2015		27.9
>20	36.6	51.1		2734		37.9
Paygrade						
E1	67.0	69.5	1.5, NS	4848		67.2
>E1	33.0	30.6		2364		32.8
Education (years)						
8-11	18.2	6.4	57.9, <.001	1234		17.1
>11	81.8	93.6		5968		82.9
Mental group*						
1-2	33.7	40.7	6.01, <.05	2203		33.8
3	30.3	36.0		1983		28.9
4-5	36.0	23.3		2339		35.8
	Controls					
Age						
<19	46.5	34.1	84.9, <.001	5285		45.4
19-20	31.3	32.6		3650		31.4
>20	22.2	33.3		2699		23.2
Paygrade						
1	68.7	76.1	25.5, <.001	8069		69.4
>1	31.3	23.9		3565		30.6
Education (years)						
8-11	16.5	5.0	98.4, <.001	1789		15.4
>11	83.5	95.0		9826		84.6
Mental group						
1-2	37.7	43.4	13.2, .001	3951		37.8
3	27.8	36.4		2926		28.0
4-5	34.5	20.3		3589		34.3

\*Lower scores indicate better mental aptitude.

TABLE II  
CHARACTERISTICS OF PSYCHOTIC GROUP AND SEX DIFFERENCES AT TIME HOSPITALIZED

Variable	n	%	Sex Difference*
Paygrade			
E1	1581	22.7	None
E2-E3	2889	41.5	
E4-E6 (Petty Off.)	2485	35.7	
Length of service (years)			
0-1	3540	49.1	Males longer
2- 6	2315	32.1	
>6	1357	18.8	
Term of enlistment			
4 yrs	4791	72.7	Females more 4 yr.
Other	1800	27.3	
No. of enlistments			
1	5081	74.6	Females fewer
>1	1728	25.4	
Type of diagnosis			
Primary	6051	83.9	None
Other	1161	16.1	
No. of diagnoses			
1	3860	53.5	None
2	1904	26.4	
3-8	1448	20.1	
Type of hosp disch.			
Direct	3728	51.7	Males more Holding Co
Holding Co.	1628	22.6	
Other	1852	25.7	
Died	4	0.0	
Condition exist prior to service			
Yes	1532	21.4	None
No	5612	78.6	
Days hospitalized			
0-5	1879	26.1	None
6-20	2296	31.8	
>20	3037	42.1	

\* $\chi^2$ ,  $p < .05$ .



TABLE III

## CHARACTERISTICS OF PSYCHOTIC AND CONTROL GROUPS AT TIME OF DISCHARGE

	Psychotics		Controls	
	n	%	n	%
Age				
17-24	3820	56.0	5561	62.1
25-34	2290	33.6	2325	25.9
>34	706	10.4	1074	12.0
Length of service (years)				
0-2	3607	52.9	2556	28.5
3-6	1765	25.9	4382	48.9
>6	1445	21.2	2029	22.6
Paygrade				
E1	1564	22.9	1598	17.8
E2-E3	2725	40.0	2151	24.0
>E3	2528	37.1	5217	58.2
Promotions				
0	2014	29.5	1338	14.9
1-2	2706	39.7	3151	35.1
>2	2097	30.8	4478	49.9
Demotions				
0	5234	76.8	6873	76.6
>0	1583	23.2	2094	23.4
Total no. hospitalizations				
1	2851	41.8	1363	60.8
2-3	2763	40.5	684	30.5
>3	1203	17.6	195	8.7
Medical boards				
0	4777	70.1	8596	95.9
1-5	2040	29.9	371	4.1
Physical eval. boards				
0	4994	73.3	8801	98.1
1-3	1823	26.7	166	1.9
Marital status				
Single	2605	43.1	4370	52.4
Married	2994	49.5	3383	40.5
Div/Sep	448	7.4	594	7.1
Recommend reenlist				
Yes	456	6.9	3922	45.5
No	2611	39.2	2476	28.7
Disab	2745	41.2	431	5.0
Other	844	12.7	1794	20.8
Early attrition				
Yes	5797	85.0	3476	38.8
No	1020	15.0	5491	61.2

**TABLE IV**  
 RELATIONSHIPS OF AGE, EDUCATION, AND MENTAL GROUP TO EARLY  
 ATTRITION FOR PSYCHOTICS AND CONTROLS

	Psychotics					Controls				
	No		Early Attrition		$\chi^2$ (p)	No		Early Attrition		$\chi^2$ (p)
	n	%	n	%		n	%	n	%	
Age*										
<19	428	18.7	1858	81.3	52.3	2563	61.2	1625	38.8	5.8
19-20	295	15.4	1621	84.6	(<.001)	1761	62.7	1047	37.3	(<NS)
>20	297	11.4	2317	88.6		1164	59.3	800	40.7	
Education* (years)										
8-11	204	17.4	971	82.6	6.6	735	47.7	805	52.3	143.3
>11	813	14.4	4820	85.6	(<.01)	4747	64.1	2663	35.9	(<.001)
Mental group**										
1-2	318	15.3	1755	84.7	0.2	1936	64.4	1069	35.6	14.3
3	289	15.5	1579	84.5	(NS)	1386	61.4	873	38.6	(<.001)
4-5	331	14.9	1887	85.1		1672	59.7	1130	40.3	

\*At time of entry into service.

\*\*Lower scores indicate better mental aptitude.

**TABLE V**  
COMPARISON OF PSYCHOTICS AND CONTROLS ON RECOMMENDATION FOR REENLISTMENT

Psychotics									
	Yes		No		Disab		Other		X <sup>2</sup> , p
	n	%	n	%	n	%	n	%	
Age*									
<19	173	7.8	922	41.3	879	39.4	256	11.5	43.6, <.001
19-20	156	8.3	678	36.2	821	43.8	220	11.7	
>20	127	5.0	1010	39.6	1045	41.0	368	14.4	
Education* (years)									
8-11	79	7.0	575	51.1	370	32.9	102	9.1	86.0, <.001
>11	377	6.8	2031	36.8	2373	43.0	741	13.4	
Mental group**									
1-2	158	7.8	798	39.4	815	40.3	252	12.5	14.6, <.02
3	120	6.6	751	41.3	747	41.1	200	11.0	
4-5	127	5.9	834	38.5	911	42.0	297	13.7	
Controls									
Age*									
<19	1836	45.6	1197	29.8	167	4.2	823	20.5	23.6, <.001
19-20	1260	46.8	747	27.7	138	5.1	548	20.3	
>20	823	43.3	532	28.0	126	6.6	419	22.1	
Education* (years)									
8-11	468	32.2	712	49.0	58	4.0	216	14.9	352.0, <.001
>11	3447	48.2	1758	24.6	372	5.2	1576	22.0	
Mental group**									
1-2	1448	50.0	697	24.1	154	5.3	596	20.6	71.9, <.001
3	958	44.3	701	32.4	92	4.3	411	19.0	
4-5	1132	42.0	890	33.0	138	5.1	535	19.9	

\*At time of entry into service.

**\*\*Lower scores indicate better mental aptitude.**

**TABLE VI**  
**INCIDENCE RATES FOR ALCOHOL PSYCHOSIS BY SEX, RACE, AND AGE**

Male	Age	No. of	Person-Years	Incidence	Confidence Intervals*	
	Group*	Cases	at Risk	Rate**	Lower	Upper
White	17-19	35	376106	9.31	6.22	12.38
	20-21	58	619087	9.37	6.96	11.77
	22-24	74	697799	10.60	8.19	13.01
	25-29	135	655557	20.59	17.12	24.06
	30-34	132	415992	31.73	26.32	37.13
	35-39	113	291920	38.71	31.57	45.83
	40-44	23	113959	20.18	11.94	28.38
	45-61	18	35836	50.23	27.07	73.26
	Total	588	3206256	18.34	16.86	19.82
Black	17-19	4	70912	5.64	0.21	11.04
	20-21	4	118310	3.38	0.13	6.62
	22-24	9	134894	6.67	2.34	10.98
	25-29	13	134684	9.65	4.42	14.85
	30-34	22	72684	30.27	17.64	42.84
	35-39	19	36947	51.43	28.34	74.39
	40-44	6	12184	49.24	10.26	87.98
	45-61	1	3207	31.18	0.00	62.36
	Total	78	583822	13.36	10.39	16.32
Other	17-19	0	14798	0.00	0.00	0.00
	20-21	3	26429	11.35	0.00	22.70
	22-24	4	36322	11.01	0.42	21.25
	25-29	3	58583	5.12	0.00	10.24
	30-34	5	54920	9.10	1.23	16.93
	35-39	3	49587	6.05	0.00	12.10
	40-44	1	27671	3.61	0.00	7.23
	45-61	1	8164	12.25	0.00	24.50
	Total	20	276474	7.23	4.07	10.38
Total	Male	686	4066552	16.87	15.61	18.13

\*Age at hospitalization.

\*\*Cases per 100,000 person-years at risk.

\*95% confidence intervals.

TABLE VI (CONT'D)  
INCIDENCE RATES FOR ALCOHOL PSYCHOSIS BY SEX, RACE, AND AGE

Female	Age Group*	No. of Cases	Person-Years at Risk	Incidence Rate**	Confidence Intervals*	
					Lower	Upper
White	17-19	7	33657	20.80	5.52	35.97
	20-21	1	57682	1.73	0.00	3.47
	22-24	10	72020	13.89	5.32	22.39
	25-29	5	70915	7.05	0.96	13.11
	30-34	7	37615	18.61	4.94	32.19
	35-39	2	16868	11.85	1.43	42.77
	40-44	0	4793	0.00	0.00	0.00
	45-61	0	1339	0.00	0.00	0.00
Total	White	32	294890	10.85	7.73	15.52
Total	Black	3	92663	3.24	0.00	6.48
Total	Other	1	16388	6.10	0.00	12.20
Total	Female	36	403940	9.16	6.21	12.10
Total	Enlisted	722	4470493	16.17	14.99	17.35

\*Age at hospitalization.

\*\*Cases per 100,000 person-years at risk.

\*95% confidence intervals.

**TABLE VII**  
**INCIDENCE RATES FOR DRUG PSYCHOSES BY SEX, RACE, AND AGE**

Male	Age Group*	No. of Cases	Person-Yrs at Risk	Incidence Rate**	Confidence Intervals*	
					Lower	Upper
White	17-19	97	376106	25.79	20.66	30.91
	20-21	121	619087	19.54	16.06	23.02
	22-24	79	697799	11.32	8.82	13.81
	25-29	48	655557	7.32	5.25	9.39
	30-34	16	415992	3.85	1.97	5.72
	35-39	2	291920	0.69	0.00	1.37
	40-44	2	113959	1.76	0.00	3.51
	45-61	1	35836	2.79	0.00	5.58
	Total	366	3206256	11.42	10.25	12.58
Black	17-19	10	70912	14.10	5.41	22.74
	20-21	15	118310	12.68	6.28	19.04
	22-24	20	134894	14.83	8.34	21.28
	25-29	19	134684	14.11	7.77	20.41
	30-34	7	72684	9.63	2.56	16.66
	35-39	2	36947	5.41	0.00	10.83
	40-44	0	12184	0.00	0.00	0.00
	45-61	0	3207	0.00	0.00	0.00
	Total	73	583822	12.50	9.63	15.36
Other	17-19	4	14798	27.03	1.02	52.90
	20-21	4	26429	18.92	2.56	35.17
	22-24	11	36322	30.28	12.47	47.99
	25-29	3	58583	5.12	0.00	10.24
	30-34	1	54920	1.82	0.00	3.64
	35-39	0	49587	0.00	0.00	0.00
	40-44	1	27671	3.61	0.00	7.23
	45-61	1	8164	12.25	0.00	24.50
	Total	25	276474	9.04	5.85	13.38
Total	Male	464	4066552	11.41	10.39	12.53

\*Age at hospitalization.

\*\*Cases per 100,000 person-years at risk.

\*95% confidence intervals.

**TABLE VII (CONT'D)**  
**INCIDENCE RATES FOR DRUG PSYCHOSES BY SEX, RACE, AND AGE**

Female	Age Group*	No. of Cases	Person-Yrs at Risk	Incidence Rate**	Confidence Intervals*	
					Lower	Upper
White	17-19	2	33657	5.94	0.00	11.88
	20-21	8	57682	13.87	4.33	23.35
	22-24	6	72020	8.33	1.74	14.88
	25-29	4	70915	5.64	0.21	11.04
	30-34	0	37615	0.00	0.00	0.00
	35-39	0	16868	0.00	0.00	0.00
	40-44	1	4793	20.86	0.00	41.73
	45-61	0	1339	0.00	0.00	0.00
Total	White	21	294890	7.12	4.05	10.15
Total	Black	3	92663	3.24	0.00	6.48
Total	Other	0	16388	0.00	0.00	0.00
Total	Female	24	403940	5.94	3.57	8.30
Total	Enlisted	488	4470493	10.91	9.94	11.98

\* Age at hospitalization.

\*\* Cases per 100,000 person-years at risk.

\*95% confidence intervals.

**TABLE VIII**  
**INCIDENCE RATES FOR SCHIZOPHRENIA BY SEX, RACE, AND AGE**

Male	Age	No. of Cases	Person-Yrs at Risk	Incidence Rate**	Confidence Intervals*	
	Group*				Lower	Upper
White	17-19	337	376106	89.60	80.03	99.16
	20-21	425	619087	68.65	62.12	75.17
	22-24	411	697799	58.89	53.35	65.01
	25-29	351	655557	53.54	48.13	59.54
	30-34	155	415992	37.26	31.39	43.12
	35-39	35	291920	11.99	8.02	15.94
	40-44	3	113959	2.63	0.00	5.27
	45-61	0	35836	0.00	0.00	0.00
	Total	1717	3206256	53.55	50.28	56.98
Black	17-19	70	70912	98.71	75.58	121.78
	20-21	142	118310	120.02	101.29	142.10
	22-24	139	134894	103.04	85.91	120.14
	25-29	122	134684	90.58	74.50	106.63
	30-34	46	72684	63.29	45.00	81.51
	35-39	9	36947	24.36	8.54	40.08
	40-44	1	12184	8.21	0.00	16.41
	45-61	0	3207	0.00	0.00	0.00
	Total	529	583822	90.60	82.89	99.03
Other	17-19	17	14798	114.88	60.39	169.07
	20-21	28	26429	105.94	66.73	144.98
	22-24	34	36322	93.61	62.15	124.93
	25-29	26	58583	44.38	27.33	61.35
	30-34	21	54920	38.24	21.91	54.49
	35-39	6	49587	12.10	2.52	21.62
	40-44	0	27671	0.00	0.00	0.00
	45-61	0	8164	0.00	0.00	0.00
	Total	132	276474	47.74	39.59	55.87
Total	Male	2378	4066552	58.47	54.90	62.13

\*Age at hospitalization.

\*\*Cases per 100,000 person-years at risk.

\*95% confidence intervals.



**TABLE VIII (CONT'D)**  
**INCIDENCE RATES FOR SCHIZOPHRENIA BY SEX, RACE, AND AGE**

Female	Age Group*	No. of Cases	Person-Yrs at Risk	Incidence Rate**	Confidence Intervals*	
					Lower	Upper
White	17-19	15	33657	44.57	22.07	66.93
	20-21	26	57682	45.07	27.76	62.31
	22-24	25	72020	34.71	21.12	48.24
	25-29	29	70915	40.89	26.02	55.70
	30-34	16	37615	42.54	21.74	63.21
	35-39	6	16868	35.57	7.41	63.55
	40-44	0	4793	0.00	0.00	0.00
	45-61	0	1339	0.00	0.00	0.00
	Total	117	294890	39.68	32.48	46.85
Black	17-19	3	10104	29.69	0.00	59.38
	20-21	7	17518	39.95	16.02	82.30
	22-24	13	23541	55.22	25.31	84.96
	25-29	18	24495	73.48	39.60	107.19
	30-34	7	11611	60.29	16.01	104.27
	35-39	2	4242	47.15	0.00	94.30
	40-44	0	999	0.00	0.00	0.00
	45-61	0	153	0.00	0.00	0.00
	Total	50	92663	53.95	40.03	71.21
Total	Other	4	16388	24.41	0.92	47.77
Total	Female	171	403940	42.33	36.15	49.57
Total	Enlisted	2549	4470493	57.01	53.53	60.66

\*Age at hospitalization.

\*\*Cases per 100,000 person-years at risk.

\*95% confidence intervals.

**TABLE IX**  
**INCIDENCE RATES FOR AFFECTIVE PSYCHOSES BY SEX, RACE, AND AGE**

Male	Age	No. of Cases	Person-Yrs at Risk	Incidence Rate**	Confidence Intervals*	
	Group*				Lower	Upper
White	17-19	161	376106	42.81	36.19	49.41
	20-21	228	619087	36.83	32.05	41.60
	22-24	247	697799	35.40	30.98	39.81
	25-29	244	655557	37.22	32.55	41.89
	30-34	182	415992	43.75	37.39	50.10
	35-39	106	291920	36.31	29.40	43.21
	40-44	36	113959	31.59	21.27	41.87
	45-61	10	35836	27.90	10.70	45.00
	Total	1214	3206256	37.86	35.73	39.99
Black	17-19	17	70912	23.97	12.60	35.28
	20-21	40	118310	33.81	23.33	44.24
	22-24	33	134894	24.46	16.12	32.77
	25-29	43	134684	31.93	22.38	41.43
	30-34	18	72684	24.76	13.35	36.12
	35-39	11	36947	29.77	12.25	47.18
	40-44	3	12184	24.62	0.00	49.24
	45-61	0	3207	0.00	0.00	0.00
	Total	165	583822	28.26	23.95	32.57
Other	17-19	8	14798	54.06	16.87	91.02
	20-21	3	26429	11.35	0.00	22.70
	22-24	10	36322	27.53	10.55	44.40
	25-29	8	58583	13.66	4.26	22.99
	30-34	10	54920	18.21	6.98	29.36
	35-39	8	49587	16.13	5.03	27.16
	40-44	8	27671	28.91	9.02	48.67
	45-61	3	8164	36.75	0.00	73.49
	Total	58	276474	20.98	15.58	26.36
Total	Male	1437	4066552	35.34	33.51	37.16

\*Age at hospitalization.

\*\*Cases per 100,000 person-years at risk.

\*95% confidence intervals.

**TABLE IX (CONT'D)**  
**INCIDENCE RATES FOR AFFECTIVE PSYCHOSES BY SEX, RACE, AND AGE**

Female	Age Group*	No. of Cases	Person-Yrs at Risk	Incidence Rate**	Confidence Intervals*	
					Lower	Upper
White	17-19	19	33657	56.45	31.11	81.66
	20-21	39	57682	67.61	47.12	93.98
	22-24	52	72020	72.20	52.57	91.76
	25-29	57	70915	80.38	59.51	101.18
	30-34	28	37615	74.44	46.88	101.87
	35-39	11	16868	65.21	26.84	103.34
	40-44	3	4793	62.59	0.00	125.18
	45-61	0	1339	0.00	0.00	0.00
	Total	209	294890	70.87	61.52	81.57
Black	17-19	3	10104	29.69	0.00	59.38
	20-21	7	17518	39.96	10.61	69.11
	22-24	9	23541	38.23	13.40	62.90
	25-29	9	24495	36.74	12.88	60.45
	30-34	10	11611	86.13	33.02	138.89
	35-39	5	4242	117.87	15.97	219.15
	40-44	0	999	0.00	0.00	0.00
	45-61	0	153	0.00	0.00	0.00
	Total	43	92663	46.40	32.53	60.22
Other	17-19	2	1652	121.07	0.00	242.13
	20-21	1	2978	33.56	0.00	87.16
	22-24	0	3903	0.00	0.00	0.00
	25-29	2	4112	48.64	0.00	97.28
	30-34	0	2349	0.00	0.00	0.00
	35-39	1	1060	94.34	0.00	188.68
	40-44	1	285	350.88	0.00	701.75
	45-61	0	-	-	-	-
	Total	7	16388	42.72	-	-
Total	Female	259	403940	64.11	56.54	72.70
Total	Enlisted	1696	4470493	37.93	35.62	40.36

\*Age at hospitalization.

\*\*Cases per 100,000 person-years at risk.

\*95% confidence intervals.

TABLE X  
INCIDENCE RATES FOR PARANOID STATES BY SEX, RACE, AND AGE

Male	Age Group*	No. of Cases	Person-Yrs at Risk	Incidence Rate**	Confidence Intervals*	
					Lower	Upper
White	17-19	12	376106	3.19	1.39	4.98
	20-21	20	619087	3.23	1.82	4.64
	22-24	21	697799	3.01	1.72	4.29
	25-29	37	655557	5.64	3.83	7.46
	30-34	30	415992	7.21	4.63	9.78
	35-39	10	291920	3.43	1.31	5.52
	40-44	4	113959	3.51	0.13	6.87
	45-61	1	35836	2.79	0.00	5.58
	Total	135	3206256	4.21	3.50	4.92
Black	17-19	5	70912	7.05	0.96	13.11
	20-21	12	118310	10.14	4.43	15.82
	22-24	15	134894	11.12	5.51	16.70
	25-29	22	134684	16.33	9.52	23.12
	30-34	11	72684	15.13	6.23	23.98
	35-39	2	36947	5.41	0.00	10.83
	40-44	1	12184	8.21	0.00	16.41
	45-61	0	3207	0.00	0.00	0.00
	Total	68	583822	11.65	8.86	14.41
Other	17-19	1	14798	6.76	0.00	13.52
	20-21	2	26429	7.57	0.00	15.13
	22-24	2	36322	5.51	0.00	11.01
	25-29	4	58583	6.83	0.26	13.36
	30-34	4	54920	7.28	0.28	14.25
	35-39	0	49587	0.00	0.00	0.00
	40-44	0	27671	0.00	0.00	0.00
	45-61	0	8164	0.00	0.00	0.00
	Total	13	276474	4.70	2.15	7.23
Total	Male	216	4066552	5.31	4.60	6.02
Total	Female	4	403940	0.99	-	-
Total	Enlisted	220	4470493	4.09	-	-

\*Age at hospitalization.

\*\*Cases per 100,000 person-years at risk.

\*95% confidence intervals.

**TABLE XI**  
**INCIDENCE RATES FOR OTHER NONORGANIC PSYCHOSES BY SEX, RACE, AND AGE**

Male	Age Group*	No. of Cases	Person-Yrs at Risk	Incidence Rate**	Confidence Intervals*	
					Lower	Upper
White	17-19	201	376106	53.44	46.05	60.82
	20-21	240	619087	38.77	33.86	43.67
	22-24	194	697799	27.80	23.89	31.71
	25-29	137	655557	20.90	17.40	24.39
	30-34	63	415992	15.14	11.40	18.87
	35-39	34	291920	11.65	7.73	15.54
	40-44	13	113959	11.41	5.23	17.55
	45-61	5	35836	13.95	1.89	25.94
	Total	887	3206256	27.66	25.84	29.48
Black	17-19	47	70912	66.28	47.33	85.16
	20-21	58	118310	49.02	36.40	61.60
	22-24	61	134894	45.22	33.87	56.53
	25-29	71	134684	52.72	40.45	64.95
	30-34	24	72684	33.02	19.82	46.15
	35-39	10	36947	27.07	10.32	43.65
	40-44	0	12184	0.00	0.00	0.00
	45-61	0	3207	0.00	0.00	0.00
	Total	271	583822	46.42	40.89	51.94
Other	17-19	13	14798	87.85	40.26	135.16
	20-21	11	26429	41.62	17.13	65.96
	22-24	17	36322	46.80	24.60	68.88
	25-29	13	58583	22.19	10.17	34.14
	30-34	8	54920	14.57	4.54	24.52
	35-39	1	49587	2.02	0.00	4.03
	40-44	3	27671	10.84	0.00	21.68
	45-61	4	8164	49.00	1.85	95.89
	Total	70	276474	25.32	19.39	31.23
Total	Male	1228	4066552	30.20	28.51	31.89

\*Age at hospitalization.

\*\*Cases per 100,000 person-years at risk.

\*95% confidence intervals.

**TABLE XI (CONT'D)**  
**INCIDENCE RATES FOR OTHER NONORGANIC PSYCHOSES BY SEX, RACE, AND AGE**

Female	Age Group*	No. of Cases	Person-Yrs at Risk	Incidence Rate**	Confidence Intervals*	
					Lower	Upper
White	17-19	22	33657	65.37	38.08	92.51
	20-21	20	57682	34.67	19.50	49.77
	22-24	23	72020	31.94	18.90	44.91
	25-29	23	70915	32.43	19.19	45.61
	30-34	11	37615	29.24	12.04	46.34
	35-39	3	16868	17.79	0.00	35.57
	40-44	2	4793	41.73	0.00	83.46
	45-61	0	1339	0.00	0.00	0.00
	Total	104	294890	35.27	28.49	42.03
Black	17-19	8	10104	79.18	24.70	133.30
	20-21	5	17518	28.54	3.87	53.07
	22-24	11	23541	46.73	19.23	74.05
	25-29	8	24495	32.66	10.19	54.99
	30-34	8	11611	68.90	21.50	116.00
	35-39	1	4242	23.57	0.00	47.15
	40-44	0	999	0.00	0.00	0.00
	45-61	0	153	0.00	0.00	0.00
	Total	41	92663	44.85	30.70	57.74
Total	Other	2	16388	12.20	0.00	24.41
Total	Female	147	403940	36.39	30.51	42.26
Total	Enlisted	1375	4470493	30.76	29.13	32.38

\*Age at hospitalization.

\*\*Cases per 100,000 Person-Years at Risk.

\*95% confidence intervals.

**TABLE XII**  
**COMPARISON OF PSYCHOTIC GROUPS BY DEMOGRAPHICS AT THE TIME OF ACCESSION PERIOD**

	Alcohol		Drug		Schizo		Affect		Par. St.		Oth. Non	
	n	%	n	%	n	%	n	%	n	%	n	%
Sex												
Female	36	5.0	24	4.9	171	6.7	259	15.3	4	1.8	147	10.7
Male	686	95.0	465	95.1	2378	93.3	1437	84.7	216	98.2	1229	89.3
Age*												
<20	339	47.0	318	65.0	1190	46.7	899	53.0	98	44.7	751	54.7
20-21	106	14.7	90	18.4	501	19.7	339	20.0	41	18.7	283	20.8
22-24	101	14.0	51	10.4	405	15.9	233	13.7	42	19.2	185	13.5
25-29	102	14.1	26	5.3	334	13.1	159	9.4	28	12.8	116	8.4
>29	73	10.1	4	0.8	118	4.6	65	3.8	10	4.6	39	2.8
Education* (years)												
8-11	134	18.7	152	31.1	397	15.6	264	15.6	26	11.8	242	17.6
12	490	68.2	305	62.4	1799	70.6	1195	70.5	161	73.2	979	71.1
13-18	94	13.1	32	6.5	353	13.8	237	14.0	33	15.0	155	11.3
Mental group**												
1-2	286	42.1	151	32.6	710	30.1	572	39.8	57	26.8	378	30.8
3	199	29.3	162	35.0	691	29.3	441	30.7	66	31.0	380	31.0
4-5	194	28.6	150	32.4	954	40.5	425	29.6	90	42.3	469	38.2

\*At time of entry into service.

\*\*Lower scores indicate better mental aptitude.

**TABLE XIII**  
COMPARISON OF PSYCHOTIC GROUPS AT THE TIME OF HOSPITALIZATION

	Alcohol		Drug		Schizo		Affect		Par. St.		Oth. Non	
	n	%	n	%	n	%	n	%	n	%	n	%
Paygrade												
E1	47	7.1	103	21.1	761	30.1	277	17.7	20	9.3	346	25.8
E2-E3	230	34.7	254	52.2	1186	46.9	517	33.0	80	37.2	569	42.4
E4-E6	385	58.2	130	26.7	584	23.1	771	49.3	115	53.5	426	31.8
Length of service (years)												
0-1	191	26.5	243	49.7	1563	61.3	683	40.3	75	34.1	724	52.6
2-6	219	30.3	206	42.1	770	30.2	518	30.5	80	36.4	456	33.1
>6	312	43.2	40	8.2	216	8.5	495	29.2	65	29.5	196	14.2
Term of enlistment												
4 years	436	62.2	364	77.3	1739	77.5	1091	69.4	149	69.6	905	73.0
Other	265	37.8	107	22.7	506	22.5	481	30.6	65	30.4	334	27.0
No. of enlistments												
1	354	49.4	421	87.5	2020	86.4	1041	63.8	140	64.8	993	78.2
>1	363	50.6	60	12.5	319	13.6	590	36.2	76	35.2	277	21.8
Type of diagnoses												
Primary	409	56.6	347	71.0	2369	92.9	1501	88.5	186	84.5	1133	82.3
Other	313	43.4	142	29.0	180	7.1	195	11.5	34	15.5	243	17.7
No. of diagnoses												
1	167	23.1	104	21.3	1851	72.6	902	53.2	116	52.7	663	48.2
2	322	44.6	171	35.0	450	17.7	423	24.9	50	22.7	439	31.9
3-8	233	32.3	214	43.8	248	9.7	371	21.9	54	24.5	274	19.9
Type hospital discharge												
Direct	580	80.3	377	77.1	1107	43.4	787	46.4	88	40.0	696	50.6
Holding Co.	45	6.2	63	12.9	651	25.5	514	30.3	56	25.5	272	19.8
Other	97	13.4	49	10.0	791	31.0	395	23.3	76	34.5	408	29.7
Existed prior to service												
Yes	32	4.5	47	9.7	879	34.7	381	22.7	32	14.7	147	10.8
No	684	95.5	437	90.3	1656	65.3	1294	77.3	185	85.3	1211	89.2
Days hospitalized												
0-5	434	60.1	232	47.4	337	13.2	358	21.1	55	25.0	394	28.6
6-20	196	27.1	184	37.6	703	27.6	499	29.4	90	40.9	576	41.9
>20	92	12.7	73	14.9	1509	59.2	839	49.5	75	34.1	406	29.5



**TABLE XIV**  
COMPARISON OF PSYCHOTIC GROUPS AT THE TIME OF DISCHARGE OR FOLLOW-UP

	Alcohol		Drug		Schizo		Affect		Par. St.		Oth. Non	
	n	%	n	%	n	%	n	%	n	%	n	%
<b>Marital Status</b>												
Single	240	38.8	246	62.1	928	43.3	567	38.4	80	39.6	491	45.1
Married	279	45.1	130	32.8	1118	52.2	785	43.1	100	49.5	534	49.0
Sep/Div.	99	16.0	20	5.1	96	4.5	125	8.5	22	10.9	64	5.9
<b>Age</b>												
17 - 24	155	24.5	324	69.8	1576	63.1	773	49.1	87	41.0	829	63.9
25 - 34	262	41.4	126	27.2	833	33.3	559	35.5	101	47.6	371	28.6
> 34	216	34.1	14	3.0	89	3.6	243	15.4	24	11.3	98	1.5
<b>Length of service (years)</b>												
0 - 2	167	26.4	211	45.5	1682	67.3	701	44.5	77	36.3	720	55.4
3 - 6	162	25.6	186	40.1	552	22.1	385	24.4	68	32.1	359	27.6
> 6	304	48.0	67	14.4	264	10.6	489	31.0	67	31.6	220	16.9
<b>Paygrade</b>												
E1	103	16.3	160	34.5	688	27.5	252	16.0	21	9.9	314	24.2
E2-E3	173	27.3	184	39.7	1206	48.3	510	32.4	72	34.0	535	41.2
> E3	357	56.4	120	25.9	604	24.2	813	51.6	119	56.1	450	34.6
<b>Total hospitalizations</b>												
1	133	21.0	191	41.2	1278	51.2	629	39.9	68	32.1	501	38.6
2-3	233	36.8	197	42.5	979	39.2	608	38.6	105	49.5	589	45.3
>3	267	42.2	76	16.4	241	9.6	338	21.5	39	18.4	209	16.1
<b>Medical boards</b>												
0	543	85.8	382	82.3	1524	61.0	1138	72.3	146	68.9	939	72.3
1-5	90	14.2	82	17.7	974	39.0	437	27.7	66	31.1	360	27.7
<b>No. physical eval.</b>												
<b>Boards</b>												
0	585	92.4	426	91.8	1549	62.0	1185	75.2	144	67.9	995	76.6
1-3	48	7.6	38	8.2	949	38.0	390	24.8	68	32.1	304	23.4
<b>Promotions</b>												
0	75	11.8	95	20.5	1030	41.2	361	22.9	35	16.5	395	30.4
1-2	223	35.2	220	47.4	1018	40.8	593	37.7	79	37.3	522	40.2
>2	335	52.9	149	32.1	450	18.0	621	39.4	98	46.2	382	29.4
<b>Demotions</b>												
0	323	51.0	233	50.2	2104	84.2	1304	82.8	163	76.9	1021	78.6
>1	310	49.0	231	49.8	394	15.8	271	17.2	49	23.1	278	21.4
<b>Unauthorized absences</b>												
0	357	56.4	283	61.0	1986	79.5	1269	80.6	166	78.3	1020	78.5
1	103	16.3	66	14.2	294	11.8	185	11.7	30	14.2	160	12.3
2-3	97	15.3	78	16.8	168	6.7	96	6.1	14	6.6	91	7.0
>3	76	12.0	37	8.0	50	2.0	25	1.6	2	0.9	28	2.2

TABLE XIV (CONT'D)  
COMPARISON OF PSYCHOTIC GROUPS AT THE TIME OF DISCHARGE OR FOLLOW-UP

	Alcohol		Drug		Schizo		Affect		Par. St.		Oth. Non	
	n	%	n	%	N	%	n	%	n	%	n	%
Desertions												
0	534	84.4	387	83.4	2306	92.3	1479	93.9	197	92.9	1205	92.8
1-5	99	15.6	77	16.6	192	7.7	96	6.1	15	7.1	94	7.2
Early attrition												
No	239	37.8	119	25.6	164	6.6	229	14.5	29	13.7	211	16.2
Yes	394	62.2	345	74.4	2334	93.4	1346	85.5	183	86.3	1088	83.8
Recommended for reenlistment												
No	355	58.8	314	72.0	832	33.7	387	25.1	73	35.3	596	46.9
Phys. disability	60	9.9	35	8.0	1215	49.2	826	53.6	111	53.6	447	35.1
Yes/Other	189	31.3	87	20.0	424	17.2	327	21.2	23	11.1	229	18.0
Remained in the Navy												
After 1992	84	11.6	23	4.7	24	.9	107	6.3	7	3.2	64	4.7

**TABLE XV**  
**SUMMARY OF SEVERITY/DURATION INDICATORS\***

Indicator	Schizo.	Affect. Psychosis	Psychotic Group		Drug	Alcohol
			Par. State	Other Nonorg.		
Existed prior to service						
Yes	34.7	22.7	14.7	10.8	9.7	4.5
Days hospitalized						
>20	59.2	49.5	34.1	29.5	14.9	12.7
Refer to med bd.						
Yes	39.0	27.7	31.1	27.7	17.7	14.2
Early attrition						
Yes	93.4	85.5	86.3	83.8	74.4	62.2
Recommend reenl						
No and No due to						
Disability	82.9	78.7	88.9	82.0	80.0	68.7
Remained in Navy						
Yes	.9	6.3	3.2	4.7	4.7	11.6

\*Percentage meeting criterion.

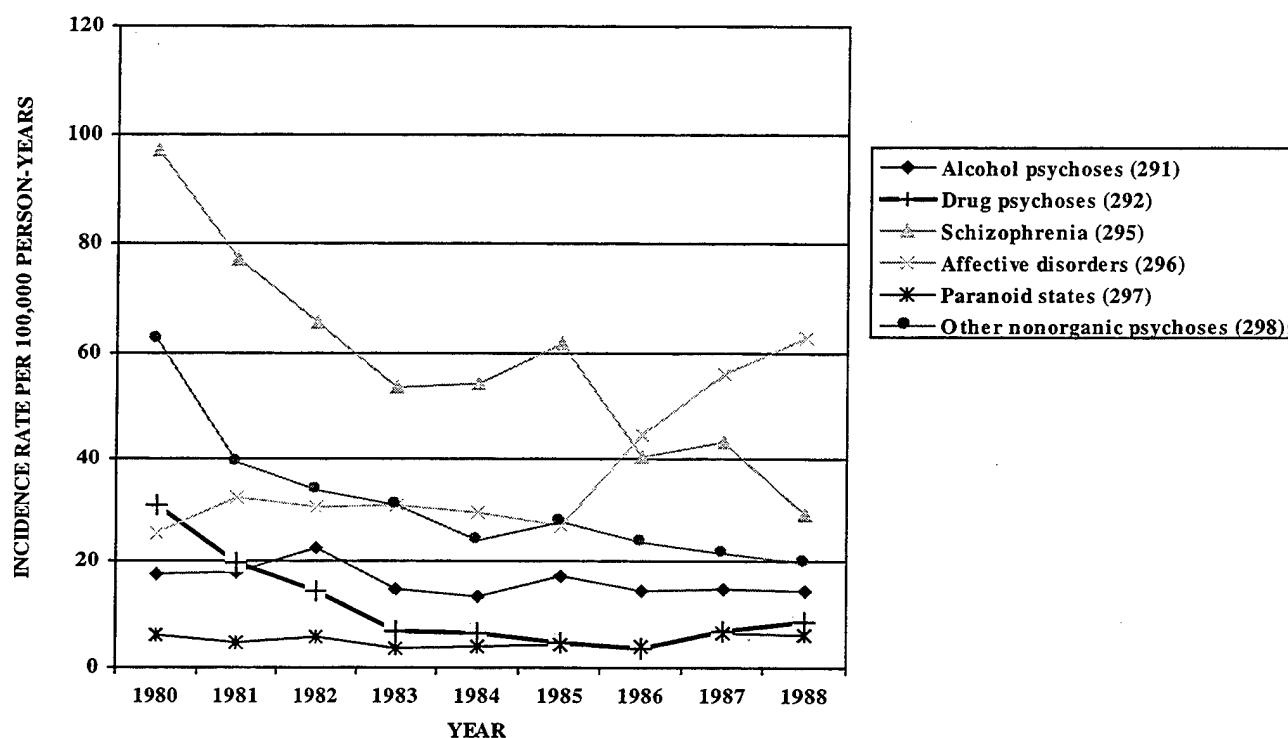


Fig. 1. Incidence rate of first hospitalizations per 100,000 person-years for major psychoses by type of psychosis (ICD-9 code) and year in active-duty U.S. Navy enlisted men and women, 1980-1988.

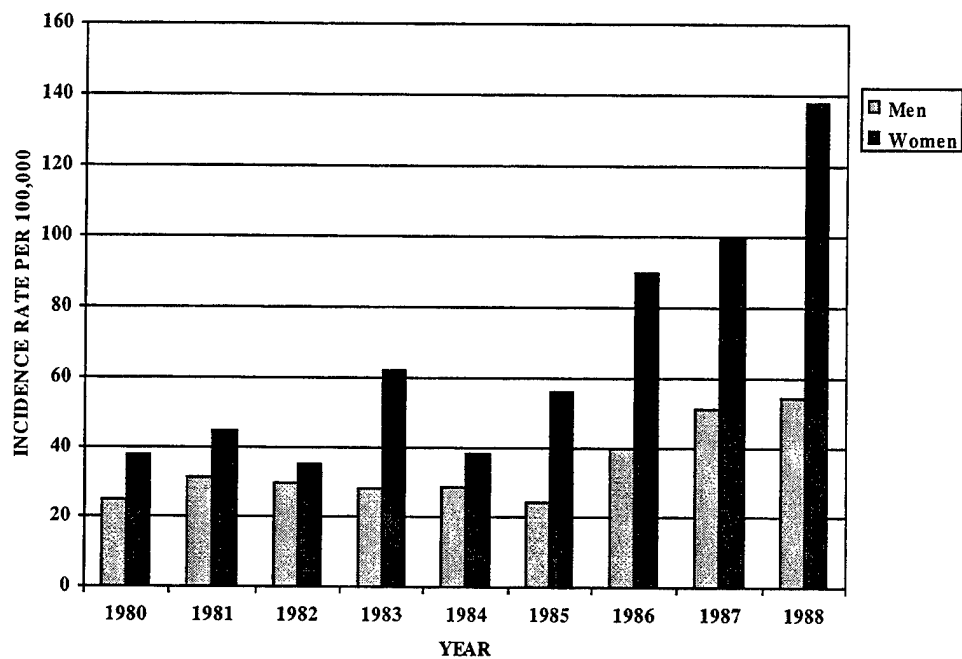


Fig. 2. Incidence rate of first hospitalizations per 100,000 for affective psychoses by gender and year in active-duty U.S. Navy enlisted men and women, 1980-1988.

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13. ABSTRACT (Maximum 200 words)  This study provides a comprehensive overview of psychosis in U.S. Navy enlisted personnel. The objectives of this study were to: 1) determine first hospitalization incidence rates of psychosis in an initially healthy young adult population; 2) determine institutional and personal costs in terms of interruption of military careers and premature manpower losses; 3) determine the age at onset (first hospitalization) and the duration of acute illness; and 4) to evaluate the effects of age, gender, race, and education on disease onset and outcome. The sample included all first hospitalizations for psychosis of active-duty enlisted personnel during the period of 1980 to 1988. All information used in this study was from official personnel and medical records. Patients' service and medical histories were tracked through 1992 to provide at least four years of follow-up data. Incidence rates varied greatly over time and across gender, age, race, and diagnostic groups. A large increase in the rate of affective psychosis for women was in sharp contrast to marked declines in rates for drug psychoses, schizophrenia, and other inorganic psychoses and the relatively stable rates for alcohol psychoses and paranoid states. Psychoses had a very significant negative impact on naval careers.				
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